

Meinhardt Infrastructure and Environment Limited

**Entrusted Portion of Widening of Tolo  
Highway / Fanling Highway between Island  
House Interchange and Fanling Stage 2**

Monthly EM&A Report

(March 2014)

Certified by: Fredrick Leong 

Position: Environmental Team Leader

Date: 11 April 2014



Our ref AFK/TK/jn/T329380/22.05/L-0020  
T 2828 5919  
E terence.kong@mottmac.com.hk  
Your ref

Hyder-Arup-Black & Veatch Joint Venture  
c/o Hyder Consulting Limited  
47/F Hopewell Centre  
183 Queen's Road East  
Wanchai, Hong Kong

Dear Sir,

11 April 2014  
By Fax (2805 5028) & Post

**Attn: Mr. James Penny**

**Environmental Monitoring and Audit (EM&A) for Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling  
Stage 2 (between Tai Hang to Wo Hop Shek Interchange) – Entrusted Works  
Environmental Permit No. EP-324/2008/B  
Condition 3.3 – Submission of Monthly EM&A Report – March 2014 for the portion of Stage 2 works entrusted to Civil Engineering and Development Department (CEDD) under Contract No. CV/2012/09**

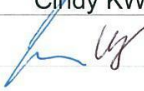

We refer to the revised Monthly EM&A Report – March 2014 received on 9 and 10 April 2014 submitted by the Environmental Team via email. Pursuant to Environmental Permit Condition 3.3, I hereby verify the Monthly EM&A Report – March 2014 (Rev. 0) for the portion of works under Stage 2 of the captioned Project which is entrusted to CEDD under Contract No. CV/2012/09.

Yours faithfully  
for MOTT MACDONALD HONG KONG LIMITED

A handwritten signature in black ink, appearing to read "Terence Kong", written in a cursive style.

Terence Kong  
Independent Environmental Checker

c.c. HyD – Mr. Chung Lok Chin (Fax: 2714 5198) / Ms. Jackie Yin (Fax: 2761 4864)  
CEDD/BCP – Mr. Chris Wong / Mr. Desmond Lam (Fax: 2714 0103)  
AECOM – Mr. Alan Lee (Fax: 3922 9797)  
Meinhardt Infrastructure and Environment Limited – Mr. Fredrick Leong (Fax: 2540 1580)

Date	Revision	Prepared By	Checked By	Approved By
11 April 2014	0	Ivan TING Cindy KWOK	Fredrick LEONG	Helen COCHRANE
				

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## EXECUTIVE SUMMARY

The Entrusted Portion of Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling Stage 2 (hereafter called “the Project”) covers part of the construction of the widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling which aimed to widen Tolo Highway and Fanling Highway to dual 4-lane carriageway in order to alleviate the current traffic congestion problems and to cope with the increasing transport demands to and from the urban areas and also cross boundary traffic. The Project covers construction activities at Yuen Leng along the existing Fanling Highway.

The impact EM&A for the Project includes air quality, noise and water quality monitoring. The EM&A programme commenced on 5 November 2013.

This report documents the findings of EM&A works conducted in March 2014. As informed by the Contractor, the major activities in the reporting period were:

- Cable detection and trial trenches;
- Tree felling works;
- Pre-drilling works and piling works;
- Extension of box culvert ID04, ID05 and BC01;
- Bored pile wall construction;
- Construction of haul road and temporary soil platform for geotechnical works;
- Slope upgrading works;
- Noise barrier installation; and
- Waterworks.

### *Breach of Action and Limit Levels for Air Quality*

One (1) Action Level exceedance of 24-hour TSP monitoring was recorded at the monitoring location AM1(SR77) on 24 March 2014 in the reporting month. Investigation for the exceedances was conducted which concluded that the exceedances was not related to the project works. The investigation reports for the incidents are presented in **Appendix M**.

No exceedance of Action and Limit Level was recorded for 1-hour TSP monitoring at the monitoring location AM1(SR77) in the reporting month.

### *Breach of Action and Limit Levels for Noise*

No noise complaint was received in the reporting month, so no Action Level exceedance was recorded. Also, no Limit Level exceedance of noise monitoring was recorded in the reporting month.

### *Breach of Action and Limit Levels for Water Quality*

Three (3) exceedances of Limit Level of Suspended Solids were recorded at the monitoring location I5 on 24, 26 and 31 March 2014 in the reporting month. One (1) exceedance of Action

Level on Turbidity was recorded at the monitoring location I5 on 31 March 2014. Investigation for the exceedance was conducted which concluded that the exceedance was not related to the project works. The investigation reports are presented in **Appendix M**.

#### *Complaint, Notification of Summons and Successful Prosecution*

No complaint, notification of summons and successful prosecution was received in the reporting month.

#### *Reporting Change*

There was no reporting of change recorded in the reporting month.

#### *Future Key Issues*

The major construction works in the coming reporting month are anticipated to include:

- Cable detection and trial trenches;
- Pre-drilling works and piling works;
- Tree felling and Transplanting works;
- Pile cap works;
- Waterworks;
- Slope upgrading works;
- Noise barrier footing;
- Laying of concrete pipe works;
- Bored pile wall construction;
- Pier Construction;
- Piling works for Bridge E;
- Site formation;
- Demolition; and
- Diversion of DN600 & DN1400.

Potential environmental impacts arising from the above construction activities are anticipated to be mainly associated with construction dust, noise, water quality and waste management.



## **1 INTRODUCTION**

1.1.1 Chun Wo Construction & Engineering Co Ltd (Chun Wo) was commissioned by the Civil Engineering and Development Department (CEDD) as the Civil Contractor for the Entrusted Portion of Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling Stage 2. Meinhardt Infrastructure & Environment Ltd (MIEL) has been appointed by Chun Wo as the Environmental Team (ET) to fulfill the corresponding EM&A requirements pursuant to Environmental Permit No. EP-324/2008/B in accordance with the Updated EM&A Manual (dated October 2013) for Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling Stage 2. The EM&A programme commenced in 5 November 2013.

### **1.2 Purpose of the Report**

1.2.1 This is the monthly EM&A Report which summaries the impact monitoring results and audit findings for the Project during the reporting month of March 2014.

### **1.3 Report Structure**

1.3.1 This monthly EM&A Report comprises the following sections:

- Section 1: Introduction
- Section 2: Project Information
- Section 3: Status of Environmental Licenses, Notifications and Permits
- Section 4: Air Quality Monitoring
- Section 5: Noise Monitoring
- Section 6: Water Monitoring
- Section 7: Waste Management
- Section 8: Environmental Site Inspection and Audit
- Section 9: Implementation Status of Environmental Mitigation Measures
- Section 10: Environmental Non-conformance
- Section 11: Future Key Issues
- Section 12: Conclusions and Recommendations

## **2 PROJECT INFORMATION**

### **2.1 Background**

- 2.1.1 Tolo Highway and Fanling Highway are expressways in the North East New Territories connecting Sha Tin, Tai Po and Fanling. These highways form a vital part of the strategic Route 1, which links Hong Kong Island to Shenzhen. At present, this section of Route 1 is a dual 3-lane carriageway. However, at several major interchanges along this section of Route 1, the highway is only dual-2 lane. Severe congestion is a frequent occurrence during peak periods, particularly in the Kowloon bound direction.
- 2.1.2 The objective of the Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling is to widen Tolo Highway and Fanling Highway to dual 4-lane carriageway in order to alleviate the current traffic congestion problems and to cope with the increasing transport demands to and from the urban areas and also cross boundary traffic.
- 2.1.3 The construction works for the Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling are to be delivered in 2 stages:
- Stage 1 – Construction works between Island House Interchange and Tai Hang; and
  - Stage 2 – Construction works between Tai Hang and Wo Hop Shek Interchange.
- 2.1.4 The construction works of Stage 1 under the EP commenced in November 2009 and was planned to be completed in December 2013 tentatively. The works of Stage 2 was planned to commence in November 2013 and complete by end of 2016. Hyder-Arup-Black and Veatch Joint Venture (HABVJV) was appointed by the Highways Department (HyD) as the consultants for the design and construction assignment for the Project. Mott MacDonald Hong Kong Ltd is the Independent Environmental Checker (IEC) of both Stage 1 and Stage 2 works.
- 2.1.5 A portion of Stage 2 works of Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling (hereafter called “the Project”) is entrusted to the contractor of Contract No. CV/2012/09 Liantang / Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works Contract 3, i.e. Chun Wo. AECOM Asia Co Ltd was appointed by the CEDD as the consultant for the design and construction assignment for the Liantang development.
- 2.1.6 The Project is a Designated Project under the Environmental Impact Assessment Ordinance (EIAO) (Cap. 499). An Environmental Impact Assessment (EIA) Report together with an Environmental Monitoring and Audit (EM&A) Manual were approved on 14 July 2000 (Register Number: EIA-043/2000). The Project is governed by an Environmental Permit (EP) (EP-324/2008) which was granted on 23 December 2008. A variation of EP (VEP) was applied and the VEP (EP-324/2008/A) was subsequently granted on 31 January 2012. An additional VEP has been applied on 24 February 2014 and the VEP (EP-324/2008/B) was subsequently granted on 17 March 2014.

### **2.2 Site Description**

- 2.2.1 The major construction activities under the Entrusted Portion of Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling Stage 2 include:

- At-Grade Road Works – Temporary and permanent road formation, pipe laying, road drainage, footpath and noise barrier construction;
- Demolition of existing Kiu Tau Footbridge and Footbridge Reprovision; and
- Box Culvert Extension – Flow diversion of existing stream, excavation, sub-base and blinding, base, wall and top slab construction.

2.2.2 **Figure 1** shows the works areas for the Entrusted Portion of Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling Stage 2.

## 2.3 Construction Programme and Activities

2.3.1 The major construction activities undertaken in the reporting month are summarized below:

- Cable detection and trial trenches;
- Tree felling works;
- Pre-drilling works and piling works;
- Extension of box culvert ID04, ID05 and BC01;
- Bored pile wall construction;
- Construction of haul road and temporary soil platform for geotechnical works;
- Slope upgrading works;
- Noise barrier installation; and
- Waterworks.

2.3.2 The construction programme is presented in **Appendix A**.

## 2.4 Project Organisation

2.4.1 The project organization structure is shown in **Appendix B**. The key personnel contact names and numbers for the Project are summarised in **Table 2.1**.

**Table 2.1 Contact Information of Key Personnel**

Party	Role	Position	Name	Telephone	Fax
AECOM	Engineer's Representative	Senior Resident Engineer	Mr. Alan Lee	2472 7228	2472 0132
		Resident Engineer (Environmental)	Mr. Perry Yam	2674 2273	--
Mott MacDonald	Independent Environmental Checker (IEC)	IEC	Mr. Terence Kong	2828 5919	2827 1823

Party	Role	Position	Name	Telephone	Fax
Chun Wo	Contractor	Site Agent	Mr. Daniel Ho	2638 6144	2638 7077
		Environmental Officer	Mr. Victor Huang	2638 6115	
		Environmental Officer	Mr. Sam Lam	2638 6147	
Meinhardt	Environmental Team (ET)	ET Leader	Mr. Fredrick Leong	2859 1739	2540 1580

### 3 STATUS OF ENVIRONMENTAL LICENSES, NOTIFICATION AND PERMITS

3.1.1 The relevant environmental licenses, permits and/or notifications on environmental protection for this Project and valid in the reporting month are summarized in **Table 3.1**.

**Table 3.1 Status of Environmental Licenses, Notifications and Permits**

Permit / License No. / Notification/ Reference No.	Valid Period		Status	Remarks
	From	To		
<b>Environmental Permit</b>				
EP-324/2008/A	31 Jan 2012	--	Superseded by EP-324/2008/B	--
EP-324/2008/B	17 Mar 2014	--	Granted on 17/03/2014	--
<b>Construction Noise Permit</b>				
GW-RN0004-14	26 Jan 2014	22 Jun 2014	Cancelled on 04/03/2014	For tree felling / transplanting works
GW-RN0109-14	25 Feb 2014	17 May 2014	Valid	For erection of catch fence in the night time
GW-RN0136-14	9 Mar 2014	22 Jun 2014	Valid	For tree felling / transplanting works
<b>Wastewater Discharge License</b>				
WT00016832-2013	28 Aug 2013	31 Aug 2018	Valid	--
<b>Chemical Waste Producer Registration</b>				
5113-634-C3817-01	7 Oct 2013	--	Valid	--
<b>Billing Account for Construction Waste Disposal</b>				
7017914	2 Aug 2013	--	Account Active	--
<b>Notification Under Air Pollution Control (Construction Dust) Regulation</b>				
--	31 Jul 2013	30 Jul 2019	Notified	--

## 4 AIR QUALITY MONITORING

### 4.1 Monitoring Requirement

- 4.1.1 In accordance with the Updated EM&A Manual, 1-hr and 24-hr total suspended particulate (TSP) levels at the designated air quality monitoring station are required. Impact 24-hour TSP monitoring should be carried out for at least once every 6 days. For the 1-hr TSP impact monitoring, the sampling frequency of at least three times in every 6 days should be undertaken when the highest dust impact occurs.

### 4.2 Monitoring Equipment

- 4.2.1 The 24-hr TSP air quality monitoring was performed using a High Volume Sampler (HVS), of which its location and operation satisfy, as far as practicable, all the requirements as specified in the Updated EM&A Manual. A portable direct reading dust meter, which was proven to be capable of achieving comparable results as that of the HVS, was used to carry out the 1-hr TSP monitoring. The brand and model of the equipment are given in **Table 4.1**.

**Table 4.1 Air Quality Monitoring Equipment**

Equipment	Brand and Model	Quantity	Serial Number
Handheld TSP meter (1-hr TSP)	TSI (Model No. AM 510)	1	11008019
High Volume Sampler (24-hr TSP)	Tisch Total Suspended Particulate Mass Flow Controlled High Volume Air Sampler (Model No. TE-5170 MFC)	1	2359

- 4.2.2 The HVS and its accessories were maintained in good working condition, such as replacing motor brushes routinely and checking electrical wiring to ensure a continuous power supply.
- 4.2.3 Calibration of the HVS (five point calibration) using Calibration Kit was carried out every two months. The HVS calibration orifice and the handheld TSP meter will be calibrated annually. Calibration certificate of the TE-5025A Calibration Kit, the handheld TSP meter and the HVS are provided in **Appendix C**.

### 4.3 Monitoring Location

- 4.3.1 Air quality monitoring was conducted at the location specified in the Updated EM&A Manual. **Table 4.2** describes the details of the air quality monitoring station with its location as shown in **Figure 2**.

**Table 4.2 Location of Air Quality Monitoring**

Air Monitoring Station ID	Monitoring Location	Description
AM1(SR77) *	Yuen Leng 2 *	Residential, Ground floor

Remark:

\* Location and Station / ASR ID as identified in Updated EM&A Manual / EIA Report for Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling

#### 4.4 Monitoring Parameters, Frequency and Duration

- 4.4.1 **Table 4.3** summarizes the monitoring parameters, frequency and duration of impact TSP monitoring.

**Table 4.3 Air Quality Monitoring Parameters, Frequency and Duration**

Parameter	Frequency and Duration
1-hour TSP	At least three times in every 6 days should be undertaken when the highest dust impact occur
24-hour TSP	Once every 6 days

#### 4.5 Monitoring Methodology

##### *24-hr TSP Monitoring*

- 4.5.1 With the consideration of criteria stated in the Updated EM&A Manual, the HVS was installed in the vicinity of the air sensitive receivers.
- 4.5.2 The relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and any special phenomena observed were recorded. The weather information was referenced from Hong Kong Observatory (<http://www.weather.gov.hk/wxinfo/pastwx/extractc.htm>).
- 4.5.3 A HOKLAS accredited laboratory, Enviro Labs Ltd. (HOKLAS no.: 128), with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments, to handle the 24-hr TSP samples, was employed for sample analysis.
- 4.5.4 Filter papers of size 8"x10" were labelled before sampling. They were inspected to be clean with no pin holes and conditioned in a humidity controlled chamber for over 24-hr and were pre-weighed before use for the sampling.
- 4.5.5 The 24-hr TSP levels were measured by following the standard high volume sampling method for TSP as set out in the Title 40 of the United States Code of Federal Regulations, Chapter 1 (Part 50), Appendix B. TSP was sampled by drawing air through a conditioned, pre-weighted filter paper inside the HVS at a controlled air flow rate. After 24-hr sampling, the filter papers loaded with dust were kept in a clean and tightly sealed plastic bag, and then returned to the laboratory for reconditioning in the humidity controlled chamber followed by accurate weighing by an electronic balance with a readout down to 0.1 mg.
- 4.5.6 All the collected samples were kept in a good condition for 6 months before disposal.

##### *1-hr TSP Monitoring*

- 4.5.7 The 1-hr TSP measurement followed manufacturer's instruction manual. Before initiating a measurement, zeroing the portable dust monitor was carried out to ensure maximum accuracy of concentration measurements.
- 4.5.8 The 1-hr TSP was sampled by drawing air into the portable dust monitor where particular concentrations were measured instantaneously with an in-built silicon

detector sensing light scattered by the particulates in the sampled air. Continuous TSP levels were indicated and logged by a built-in data logger compatible with Windows based program to facilitate data collection, analysis and reporting.

#### 4.6 Monitoring Schedule for the Reporting month

- 4.6.1 The schedule for environmental monitoring for the reporting month is provided in **Appendix D**. Meteorological data extracted from Hong Kong Observatory for the reporting month is provided in **Appendix E**.

#### 4.7 Monitoring Results

- 4.7.1 The monitoring results for 1-hr and 24-hr TSP are summarised in **Table 4.4** and **Table 4.5** respectively. Detailed air quality monitoring results and the graphical presentation of air quality monitoring data for the current and past three reporting months are presented in **Appendix F**.

**Table 4.4 Summary of 1-hr TSP Monitoring Results**

ASR ID	Average ( $\mu\text{g}/\text{m}^3$ )	Range ( $\mu\text{g}/\text{m}^3$ )	Action Level ( $\mu\text{g}/\text{m}^3$ )	Limit Level ( $\mu\text{g}/\text{m}^3$ )
AM1(SR77) *	200.3	161.0 – 232.0	292.7	500

Remark:

\* Station / ASR ID as identified in Updated EM&A Manual / EIA Report for Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling

**Table 4.5 Summary of 24-hr TSP Monitoring Results**

ASR ID	Average ( $\mu\text{g}/\text{m}^3$ )	Range ( $\mu\text{g}/\text{m}^3$ )	Action Level ( $\mu\text{g}/\text{m}^3$ )	Limit Level ( $\mu\text{g}/\text{m}^3$ )
AM1(SR77) *	139.4	67.1 – 188.1	170.3	260

Remark:

\* Station / ASR ID as identified in Updated EM&A Manual / EIA Report for Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling

- 4.7.2 One (1) Action Level exceedance of 24-hour TSP monitoring was recorded at the monitoring location AM1(SR77) on 24 March 2014 in the reporting month. Investigation for the exceedances was conducted which concluded that the exceedances were not related to the project works. The investigation reports for the incidents are presented in **Appendix M**.
- 4.7.3 No exceedance of Action and Limit Level was recorded for 1-hour TSP monitoring at the monitoring location AM1(SR77) in the reporting month.
- 4.7.4 The Event and Action Plan for the occurrence of non-compliance of the air quality criteria is annexed in **Appendix G**.
- 4.7.5 Details of monitoring conditions including influencing factors such as weather conditions and site observation are presented in **Appendix E**.



## 5 NOISE MONITORING

### 5.1 Monitoring Requirements

- 5.1.1 In accordance with the Updated EM&A Manual, the impact noise monitoring frequency shall depend on the scale of the construction activities. An initial guide on the regular monitoring frequency should be at least once per week when noise generating activities are underway.

### 5.2 Monitoring Equipment

- 5.2.1 Noise monitoring was performed using a sound level meter at the monitoring station. The sound level meter deployed complies with the International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) specifications. An acoustic calibrator was deployed to check the sound level meter at a known sound pressure level. The brand and model of the equipment is given in **Table 5.1**.

**Table 5.1 Noise Monitoring Equipment**

Equipment	Brand and Model	Quantity	Serial Number
Sound Level Calibrator	B&K (Model No. 4231)	1	2685684
Sound Level Meter	Rion (Model No. NL-52)	1	00220553

- 5.2.2 The sound level calibrator and sound level meter were verified by the certified laboratory once every two years. Calibration certificates of the sound level meter and acoustic calibrator are provided in **Appendix C**.

### 5.3 Monitoring Locations

- 5.3.1 Impact noise monitoring was conducted at the location specified in the Updated EM&A Manual. **Table 5.2** describes the details of the noise monitoring station with its location as shown in **Figure 2**.

**Table 5.2 Location of Noise Monitoring**

NSR ID	Monitoring Location	Description
M1(SR77) *	Yuen Leng 2 *	Residential, Ground floor

Remark:

\* Location and Station / NSR ID as identified in Updated EM&A Manual / EIA Report for Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling

### 5.4 Monitoring Parameters, Frequency and Duration

- 5.4.1 **Table 5.3** summarizes the monitoring parameters, frequency and duration of impact noise monitoring.

**Table 5.3 Noise Monitoring Parameters, Frequency and Duration**

Parameter and Duration	Frequency
30-mins measurement at between 0700 and 1900 on normal weekdays. Leq, L10 and L90 would be recorded.	At least once per week

## **5.5 Monitoring Methodology**

5.5.1 The monitoring procedures are summarised as below:

- (a) The microphone head of the sound level meter was positioned 1m exterior of the noise sensitive facade and lowered sufficiently so that the building's external wall acts as a reflecting surface.
- (b) The battery condition was checked to ensure good functioning of the meter.
- (c) Parameters such as frequency weighting, the time weighting and the measurement time were set as follows:
  - (i) frequency weighting: A
  - (ii) time weighting: Fast
  - (iii) parameters: Leq, L10 and L90
  - (iv) time measurement: Leq(30-minutes) during non-restricted hours i.e. 07:00 – 1900 hrs on normal weekdays; Leq(5-minutes) during restricted hours i.e. 19:00 – 23:00 hrs and 23:00 – 07:00 hrs of normal weekdays, whole day of Sundays and Public Holidays
- (d) Prior to and after each noise measurement, the meter was calibrated using the acoustic calibrator for 94dB(A) at 1000 Hz. If the difference in the calibration level before and after measurement was more than 1dB(A), the measurement would be considered invalid and repeat of noise measurement would be required after re-calibration or repair of the equipment.
- (e) At the end of the monitoring period, the Leq, L10 and L90 were recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.
- (f) A façade correction of +3dB (A) shall be made to the noise parameter obtained by free field measurement.

## **5.6 Monitoring Schedule for the Reporting Month**

5.6.1 The schedule for environmental monitoring for the reporting month is provided in **Appendix D**. Meteorological data extracted from Hong Kong Observatory for the reporting month is provided in **Appendix E**.

## **5.7 Monitoring Results**

5.7.1 The monitoring results for noise are summarized in **Table 5.4** and the monitoring results and the graphical presentation of noise level for the current and past three reporting months are presented in **Appendix H**.

**Table 5.4 Summary of Noise Monitoring Results**

Noise Monitoring Station ID	Average, dB(A), Leq (30min) <sup>(2)</sup>	Range, dB(A), Leq (30min) <sup>(2)</sup>	Action Level	Limit Level, dB(A)
M1(SR77) <sup>(1)</sup>	64.9	61.6 – 66.9	When one documented valid complaint is received	75

Remark:

(1) Station / NSR ID as identified in Updated EM&A Manual / EIA Report for Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling

(2) +3dB(A) façade correction included

- 5.7.2 Major noise sources during the noise monitoring included construction activities of the Project and that along Tai Wo Service Road East, and nearby traffic noise.
- 5.7.3 No noise complaint was received in the reporting month, so no Action Level exceedance was recorded. Also, no Limit Level exceedance of noise monitoring was recorded in the reporting month.
- 5.7.4 The Event and Action Plan for the occurrence of non-compliance of the noise criteria is annexed in **Appendix G**.

## 6 WATER MONITORING

### 6.1 Monitoring Requirements

- 6.1.1 In accordance with the Updated EM&A Manual, during the course of the culvert extension works, monitoring shall be undertaken on three occasions per week. The interval between two sets of monitoring shall not be less than 36 hours except where there are exceedances of Action and/or Limit levels.

### 6.2 Monitoring Equipment

- 6.2.1 The equipment used in the water quality monitoring programme is summarised in **Table 6.1**.

**Table 6.1 Water Quality Monitoring Equipment**

Equipment	Model and Make
Turbidity meter	HACH Model 2100Q is (Serial No. 11050C001264)
Multimeter (Scope of Test: Conductivity, Dissolved Oxygen, pH, Salinity and Temperature)	YSI Proplus (Serial No. 09K100735)

- 6.2.2 The monitoring instruments were checked, calibrated and certified by a laboratory accredited under HOKLAS before use and subsequently re-calibrated at 3-monthly intervals throughout all stages of the water quality monitoring. Copies of the calibration certificates for the water quality monitoring equipment are attached in **Appendix C**.

### 6.3 Monitoring Parameters, Frequency and Duration

- 6.3.1 Measurements for each monitoring station were conducted 3 days per week for the reporting month. **Table 6.2** summarises the monitoring parameters, frequency and duration of the baseline water quality monitoring.

**Table 6.2 Water Quality Monitoring Parameters, Frequency and Duration**

Monitoring Stations	Parameter, unit	Frequency
Control Stations: C3a and C3b Impact Station: I5	<ul style="list-style-type: none"> <li>- Depth, m</li> <li>- Temperature, °C</li> <li>- Salinity, ppt</li> <li>- pH</li> <li>- DO, mg/L</li> <li>- DO Saturation, %</li> <li>- Turbidity, NTU</li> <li>- SS, mg/L</li> </ul>	3 days per week

### 6.4 Monitoring Locations

- 6.4.1 According to the Updated EM&A Manual, measurements were taken at all impact and control stations as summarised in **Table 6.3**. The locations of the monitoring stations are shown in **Figure 3**.

**Table 6.3 Locations of Water Quality Monitoring**

Station	Description	Easting	Northing
I5	Downstream of Ma Wat River (Yuen Leng)	833931	837859
C3a	Upstream of Ma Wat River (Nam Wa Po)	833816	837644
C3b	Upstream of Ma Wat River (Yuen Leng)	833931	837736

## 6.5 Monitoring Methodology

### *Instrumentation*

- 6.5.1 The parameters of in-situ measurements included water depth, dissolved oxygen (DO), dissolved oxygen saturation (DOS), turbidity level, pH value and water temperature.

### *Operating/Analytical Procedures*

- 6.5.2 Since water depths for all monitoring stations were less than 1m throughout the whole baseline measurement period, only mid-depth level was monitored.
- 6.5.3 At each monitoring station, at least duplicate readings of dissolved oxygen content and turbidity were taken. The probes were retrieved out of the water after the first measurement and then re-deployed for the second measurement.
- 6.5.4 Water samples were collected by the water sampler and filled into polyethylene bottles for laboratory determination of suspended solids. Sampling bottles were pre-rinsed with the same water samples, and filled up to the rim, capped tightly and labeled immediately. The sample bottles were then packed into a cool-box kept at 4°C, and delivered to a HOKLAS accredited laboratory, Enviro Labs Ltd. (HOKLAS no.: 128) for analysis. The results for laboratory analysis of suspended solids are presented in **Appendix I**.

## 6.6 Monitoring Schedule for the Reporting Month

- 6.6.1 The schedule for environmental monitoring for the reporting month is provided in **Appendix D**. Meteorological data extracted from Hong Kong Observatory for the reporting month is provided in **Appendix E**.

## 6.7 Monitoring Results

- 6.7.1 The water quality criteria, namely Action and Limit Levels, as specified in the Updated EM&A Manual are shown in **Table 6.4**.

**Table 6.4 Action and Limit Levels for Water Quality Monitoring**

Parameters	Action	Limit
DO in mg/L	6.7 mg/L	4 mg/L or 40% saturation at 15 degree Celsius
SS in mg/L	42.6 mg/L or 120% of upstream control station's SS of the same day	46.8 mg/L or 130% of upstream station's SS of the same day and specific sensitive receiver water quality requirements

Parameters	Action	Limit
Turbidity (Tby) in NTU	81.9NTU or 120% of upstream control station's Tby of the same day	91.9NTU or 130% of upstream control station's Tby of the same day

Notes:

For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.

For SS and Tby, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

- 6.7.2 The detailed water quality monitoring results and the graphical presentation of water quality monitoring data for the current and past three reporting months are presented in **Appendix J**.
- 6.7.3 The possible influences in monitoring results were suspected to be natural variation.
- 6.7.4 Three (3) exceedances of Limit Level of Suspended Solids were recorded at the monitoring location I5 on 24, 26 and 31 March 2014 in the reporting month. One (1) exceedance of Action Level on Turbidity was recorded at the monitoring location I5 on 31 March 2014. Investigation for the exceedance was conducted which concluded that the exceedance was not related to the project works. The investigation reports are presented in **Appendix M**.
- 6.7.5 The Event and Action Plan for the occurrence of non-compliance of the water quality criteria is annexed in **Appendix G**.

## 7 WASTE MANAGEMENT

- 7.1.1 The Contractor has registered as a chemical waste producer of the Project. The C&D materials and waste sorting were carried out on-site. Receptacles were provided for general refuse collection.
- 7.1.2 As advised by the Contractor, a total of 4,460m<sup>3</sup> of excavated material has been generated. 2,862m<sup>3</sup> of inert C&D materials was disposed of at public fill to Tuen Mun Area 38. 1,092m<sup>3</sup> of inert C&D materials was reused on site. 265m<sup>3</sup> of general refuse was disposed of at North East New Territories (NENT) Landfill. No plastics, paper/cardboard packaging was collected, and no metals were collected by recycling contractor in the reporting month. No chemical waste was collected by licensed contractor in the reporting period. Details of the waste management data are presented in **Appendix K**.
- 7.1.3 In the reporting month, the Contractor was reminded to properly maintain the site tidiness and dispose of wastes accumulated site regularly and properly.

## 8 ENVIRONMENTAL SITE INSPECTION AND AUDIT

### 8.1 Site Inspection

- 8.1.1 Site inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures for the Project. A summary of the site inspection is provided in **Appendix L**.
- 8.1.2 In the reporting month, 5 site inspections were carried out on 3, 10, 17, 24 and 31 March 2014. The one held on 31 March 2014 was a joint inspection with the IEC, ER, ET and Contractor. No site inspection was conducted by the EPD during the reporting month. No non-compliance was recorded during the site inspection. A summary of the reminders and observations recorded during the site inspections are presented in **Table 8.1**.

**Table 8.1 Observations and Recommendations of Site Audit**

Parameters	Date	Observations and Recommendations	Follow-up
Water Quality	N/A	N/A	N/A
Air Quality	3 Mar 2014	Reminder: The contractor was reminded to provide sufficient water spraying at SA12.	The area has been watered as observed during the site inspection on 10 Mar 2014..
Noise	N/A	N/A	N/A
Waste / Chemical Management	N/A	N/A	N/A
Landscape & Visual	N/A	N/A	N/A
Permits / Licenses	N/A	N/A	N/A



## 9 IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

- 9.1.1 The Contractor has implemented the relevant environmental mitigation measures as specified in the EIA Reports, EPs and updated EM&A Manual. The implementation status of environmental mitigation measures during the reporting period is summarized in **Appendix L**. The status of the required submissions under the EP during the reporting period is summarized in **Table 9.1**.

**Table 9.1 Status of Required Submission under Environmental Permit**

EP Condition	Submission	Submission Date
Condition 3.3	Monthly EM&A Report	13 March 2014

## **10 ENVIRONMENTAL NON-CONFORMANCE**

### **10.1 Summary of Monitoring Exceedances**

- 10.1.1 One (1) Action Level exceedance of 24-hour TSP monitoring was recorded at the monitoring location AM1(SR77) on 24 March 2014 in the reporting month. Investigation for the exceedances was conducted which concluded that the exceedances were not related to the project works. The investigation reports for the incidents are presented in **Appendix M**.
- 10.1.2 No exceedance of Action and Limit Level was recorded for 1-hour TSP monitoring at the monitoring location AM1(SR77) in the reporting month.
- 10.1.3 No noise complaint was received in the reporting month, so no Action Level exceedance was recorded. Also, no Limit Level exceedance of noise monitoring was recorded in the reporting month.
- 10.1.4 Three (3) exceedances of Limit Level of Suspended Solids were recorded at the monitoring location I5 on 24, 26 and 31 March 2014 in the reporting month. One (1) exceedance of Action Level on Turbidity was recorded at the monitoring location I5 on 31 March 2014. Investigation for the exceedance was conducted which concluded that the exceedance was not related to the project works. The investigation reports are presented in **Appendix M**.

### **10.2 Summary of Environmental Non-Compliance**

- 10.2.1 No environmental non-compliance was recorded in the reporting month. The cumulative statistics are provided in **Appendix N**.

### **10.3 Summary of Environmental Complaints**

- 10.3.1 No environmental complaint was received in the reporting month. The cumulative statistics are provided in **Appendix N**.

### **10.4 Summary of Environmental Summon and Successful Prosecutions**

- 10.4.1 No environmental related prosecution or notification of summons was received in the reporting month. The cumulative statistics are provided in **Appendix N**.

## **11 FUTURE KEY ISSUES**

### **11.1 Construction Programme for the Next Month**

11.1.1 The major construction works in the coming reporting month are anticipated to include:

- Cable detection and trial trenches;
- Pre-drilling works and piling works;
- Tree felling and transplanting works;
- Pile cap works;
- Waterworks;
- Slope upgrading works;
- Noise barrier footing;
- Laying of concrete pipe works;
- Bored pile wall construction;
- Pier Construction;
- Piling works for Bridge E;
- Site formation;
- Demolition; and
- Diversion of DN600 and DN1400.

### **11.2 Key Issues for the Coming Month**

11.2.1 Key issues to be considered in the coming month are anticipated to include:

- Site runoff should be properly collected and treated prior to discharge;
- Properly maintain all drainage facilities and wheel washing facilities on site;
- Chemical, chemical waste and waste management;
- Tree protective measures for all retained trees should be well maintained;
- Expose slopes and dusty stockpile should be covered up properly if no temporary work will be conducted; and
- Operation of construction plant should be sequenced where practicable.

### **11.3 Monitoring Schedule for the Next Month**

- 11.3.1 The tentative schedule for environmental monitoring for the coming month is provided in **Appendix D**.

## **12 CONCLUSIONS AND RECOMMENDATIONS**

### **12.1 Conclusions**

- 12.1.1 The construction phase EM&A programme of the Project commenced on 5 November 2013.
- 12.1.2 The 1-hr TSP, 24-hr TSP, noise and water monitoring were carried out in the reporting period.
- 12.1.3 One (1) Action Level exceedances of 24-hour TSP monitoring was recorded at the monitoring location AM1(SR77) on 24 March 2014 in the reporting month. Investigation for the exceedances was conducted which concluded that the exceedances were not related to the project works. The investigation reports for the incidents are presented in **Appendix M**.
- 12.1.4 No exceedance of Action and Limit Level was recorded for 1-hour TSP monitoring at the monitoring location AM1(SR77) in the reporting month.
- 12.1.5 No noise complaint was received in the reporting month, so no Action Level exceedance was recorded. Also, no Limit Level exceedance of noise monitoring was recorded in the reporting month.
- 12.1.6 Three (3) exceedances of Limit Level of Suspended Solids were recorded at the monitoring location I5 on 24, 26 and 31 March 2014 in the reporting month. One (1) exceedance of Action Level on Turbidity was recorded at the monitoring location I5 on 31 March 2014. Investigation for the exceedance was conducted which concluded that the exceedance was not related to the project works. The investigation reports are presented in **Appendix M**.
- 12.1.7 Five (5) environmental site inspections were carried out in the reporting month. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audit.

### **12.2 Recommendations**

- 12.2.1 According to the environmental site inspections performed in the reporting month, the following recommendations were provided:

#### *Air Quality*

- Water spraying should be properly implemented whenever necessary for the unpaved roads, access roads and construction areas..

#### *Water Quality*

- Silty effluent should be treated/desilted before discharged. Untreated effluent should be prevented from entering public drain channel.

#### *Chemical and Waste Management*

- Ensuring regular maintenance and cleaning of waste storage area.